

Development of the Placenta:

1-Morula → Blastocyst → (Implantation) → Inner cell mass and outer Trophoblast

2-Trophoblast → inner Cytotrophoblast & outer Syncytiotrophoblast

3-Trophoblast → Chorion → Invades uterus as Chorionic Villi (Fetal part of placenta)

4-The part that the villi invade from placenta is called Decidua basalis (Maternal part of placenta)

Anatomy of the Placenta:

- Oval or Circular in shape -has 2 surfaces (Fetal & Maternal) - Diameter: 15-20 cm -Weight: 500 gm

- Fetal surface is attached to the umbilical cord and just beneath it there is the Chorionic plate where the umbilical cord is inserted

- Maternal surface is dark red in color and divided into 15-20 Lobules called (Cotyledons)

Functions of the placenta:

1-Nutritive 2-Respiratory 3-Excretory

4-Hormonal: •Steroid hormones (Estrogen & Progesterone) •Relaxin

 •hCG (appears in maternal serum 7-8 days after fertilization, β -hCG → pregnancy test)
 •Other Hypothalamic-like and Pituitary-like hormones

5-Production of Enzymes: e.g. Estronase, Histaminase

6-Barrier function: prevent passage of toxins and infections to the fetus

*Barrier is formed by: Cytotrophoblast, Syncytiotrophoblast, Mesoderm, Wall of the Blood Vessels

■Drugs pass → Penicillins (Ampicillins), Cephalosporins ■Drugs don't pass → Chloroform

Abnormalities of the Placenta:

A) Shape & Size:

1-Bilobate Placenta: 2 Lobes connected by a bridge of placental tissue

2-Bipartite placenta: 2 Parts connected by a membrane

3-Placenta Succenturiata: an accessory portion attached to the main placenta with vessels

** The accessory part may be missed after delivery causing ante/postpartum Hemorrhage and sepsis

4-Diffuse (Membranous) Placenta: ↑ Placental Diameter up to 15-20 inch (38-50 cm), lead to P. Previa

5-Circumvallate Placenta: Chorion frondosum (Fetal part of placenta) is too small → a ring of raised tissue develops and the ends of the placenta start to turn inward. This restricts the supply of nutrients to the growing fetus and can also increase the risk of a placental separation.

*May lead to: •Abortion •Pre-term labor •IUGR •IUFD

B) Adhesion:

1-Placenta Accreta: absence of decidua basalis → invasion of uterus by chorionic villi but no invasion of the myometrium (just in contact with it)

Surgical treatment may only be Hysterectomy

Risk ↑ due to ↑ cesarean Section

2-Placenta Increta: Villi invades the myometrium

3- Placenta Percreta: Invasion of all layers and villi reaches the peritoneal cavity

C) Weight: -Increased (up to half of the fetal weight) in: DM, Polyhydramnios, Rh Incompatibility

D) Position: (normally in the upper uterine segment)

- Placenta Previa: placenta in lower segment

*Ranging from not reaching (Minor) up to covering (Major) the internal cervical os

E) Attachment of the Cord: (Normal → 80% eccentric)

1-Marginal: attached to margins of the placenta

2-Membranous: attached to membrane around placenta, may lead to ante-partum hge (Vasa Previa)

F) Placenta Infarcts:

1-White: Physiological 2-Red: with hypertensive conditions e.g. Preeclampsia, gestational Htn



Fetal Membranes:

Chorion: outer, in contact with uterine wall, thicker, ends the surface of placenta

Amnion: inner, surrounds the fetus directly, contain the amniotic fluid, and covers the cord

Amniotic Fluid:

-Characters

A-Physical:

-Colorless: may be physiologically pale yellow or white (white in vernix caseosa)

*Dark yellow or green (Meconium): indicate the baby has had a bowel movement (sign of fetal distress)

-pH: Neutral or Alkaline (7-7.5)

-Sources: •Maternal: Plasma proteins •Fetal: urine, salivary & buccal secretions, skin

-Volume: •16w→250ml •36w→1 liter •38w→500-800cc

B-Chemical: -Formed of water (98-99%) and solids (CHO e.g. Glucose and Lipids)

-Functions:

a-During pregnancy:

1-Protect fetus from trauma 2-Preserves fetal pressure constant 3-Medium for fetal urination

4-Allow free fetal movements that give chance for growth 5-Has a role in nutrition

b-At Labor:

1-Help in irritation of cervix 2-Membrane rupture → wash bacteria from the birth canal

*Fetal kidneys start production of urine by the 12th week

Umbilical Cord:

-Length: 50-70 cm -Diameter: 2 cm

-Contain: •2 umbilical arteries (Deoxygenated blood) • 1 umbilical veins (Oxygenated blood)
• Remnants of the yolk sac and allantois

-Abnormalities:

1- Attachment: Marginal – Membranous

2- Short: (less than 30 cm) *Absolute *Relative: d.t. coiling around fetus

May cause: 1-Delay in the fetal descend 2-premature separation of the placenta

3-Uterine inversion 4-Cord Avulsion

3- Long: (more than 100 cm): May cause:

■ Coiling of the cord around fetus (esp. neck) *Incidence: 1 Lobe→20%, 2 Lobes→2%, 3 Lobes→0.2%

■ Knot of the Cord: •True: d.t. Long cord (cause of unexplained IUGR) •False: d.t. material collection

4- Congenital Umbilical Hernia

Fetal Circulation:

-Differs from Adult:

1-Adult circulation is Closed, while fetal circulation is parallel through heart and shunts

2-Fetal circulation has Two Shunts: Foramen ovale (between the 2 Atria)

Ductus Arteriosus (between the truncus pulmonalis and the aorta)

3-The vital organs in fetus are: Brain and Liver

-Changes after Delivery:

1-Clamping of the cord → Hypoxemia → stimulation of the respiratory movement → Deep inspiration

→ Air Suction → Opening of the Broncho-Alveolar Tree

2-Air entry in the lung → ↓ pressure on the right side → Closure of Foramen ovale & Ductus arteriosus

3-Umbilical vein → become Ligamentum Teres (Round ligament of the liver)

Umbilical artery → Medial Umbilical Artery

Ductus Venosus → Ligamentum Venosum

Ductus Arteriosus → Ligamentum Arteriosum

